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CHRONIC BOVINE MASTITIS: FACTORS POSSIBLY RELATED TO ITS PATHOGENESIS

A SHORT REVIEW

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During the past decade the bacteriology of mastitis has been extensively studied with the result that the three types of streptococci usually associated with the disease have been clearly defined (Minett, Stableforth and Edwards, 1929; Edwards, 1932; Little and Minett, 1939) and the important part played by *Str. agalactiae* in the deterioration of the bovine udder is now beyond dispute. Notwithstanding this knowledge a perusal of the literature shows that there are factors in the transmission of mastitis which are inadequately understood. Christiansen and Nielsen (1934) have said, "As most cases of mastitis develop without any preceding lesion of the sphincter and as we have been unable to produce mastitis artificially by external infection of the teat when its closing mechanism is unimpaired, it must be assumed that under natural conditions there must be some factors as yet unknown which govern the entrance of bacteria by way of the teat canal." [It is possible that the negative results in some experiments should be interpreted with caution as Minett (1934) and Steck (1934) have suggested that there may be a lengthy incubation period.] On the other hand Bendixen (1934) has stressed the importance of teat injury in the spread of mastitis, and no doubt it plays some part, but Seelemann (*cit.* Jones and Little, 1934) also believes, on the result of herd transmission experiments, that there is some unknown factor necessary for the establishment of infection.

In the host-parasite relationship the phenomenon of infectivity is as much a function of host susceptibility, or resistance, as it is of parasite invasiveness and because it is felt that bacteriological studies have not accounted for all features of chronic mastitis it is the problem of host susceptibility which will be chiefly considered in this review.

The establishment of infection in the mammary tissue depends on the three main factors: –

(1) The ease with which streptococci pass through the teat canal and reach the gland cistern.

(2) The bacteriostatic properties of milk.

(3) The inherent powers of resistance possessed by the mammary tissue. Specific immunity to streptococci, if it exists, is not considered.

It will be seen that these three factors are probably all influenced to some extent by hereditable characteristics, and Ward (1938-39) has adduced evidence which suggests that susceptibility to mastitis is influenced by hereditary factors.

(I) *Factors affecting the ease with which streptococci pass through the teat canal.*

Little (1937*a*) has shown that the smallest number of *Str. agalactiae* which will produce mastitis with any degree of regularity when introduced beyond the teat canal is approximately 6,000. The same author (1937*b*) showed that the external infection of the teats by simply rubbing culture over the tip or the application of rubber bags containing culture failed to produce mastitis, but infection could be set up by dipping the teats in culture, applying pressure and then releasing it. By this method infection could fairly easily be established in old cows which were easy to milk but it was difficult to infect heifers.

To anyone who has observed cows during the summer it is fairly obvious that certain insects might play some part in introducing infection through the teat canal. Sanders (1940*a*) has described the indiscriminate feeding habits and the mouth parts of *Musca domestica*, which make it an excellent vector for bovine mastitis. Experiments appear to have confirmed the view that *Musca domestica* transmits chronic streptococcal mastitis. In a subsequent report Sanders (1940*b*) has pointed out that flies of the Hippelates species (known in America as eye gnats) are often present in the vicinity of the mucous membranes of all the external orifices of cattle including the teats of calves and heifers as well as lactating cows. They were observed to feed on excretions and exudates and are thus possible vectors of mastitis, brucellosis, or listerellosis. Hippelates obtained from naturally infected cows and those fed on infected secretion were able to produce *Str. agalactiae* infection of the udder when applied to the teats of normal cows.

Johnston (1938) has made observations on 324 teats obtained from cows at *post-mortem* examination. Variations in the teat canal are described and the presence of pouches and irregularities in the lining of the epithelium of the teat sinus were noted in some cases. Teats were attached to an inverted bottle from which the bottom had been removed and a number of experiments were carried out. It was shown that the pouches mentioned above retained carbon particles

during the milking process and that carbon particles applied to the tip of the teat passed into the teat cistern when pressure was alternately applied to and released from the teat. It was also noted, as would be expected, that if the upper end of the teat was not occluded before applying pressure a stream of carbon particles passed into the bottle. It is improbable that milking machines occlude the upper end of the teat as efficiently as the hand milker and in this way they may increase the susceptibility to mastitis.

Despite the above findings, and in view of the frequent failure of transmission experiments, it is felt that factors which govern the establishment of the very small numbers of streptococci, which undoubtedly succeed in passing through the teat canal, in the mammary tissue must be considered.

(II and III) *The bactericidal properties of milk and the resistance of mammary tissue to infection.*

Jones and Little (1927) have shown that milk contains a specific bactericidal substance which prevents the multiplication of bacteria for some time. Therefore, when milk is frequently withdrawn, as in natural suckling, streptococci have little chance to multiply. Apart from this specific substance, the efficiency of which varies from cow to cow and even from quarter to quarter in the same cow (Burkey, *et al.*, 1938), certain physiological disturbances may affect the bacteriostatic properties of milk and the resistance of the udder tissue.

It is well known that as the lactation period advances there is an increase in *p*H, catalase and chloride with a corresponding decrease in the lactose content of the milk. An interesting theory as to how these changes occur under physiological and pathological conditions has been advanced by Garrison and Turner (1936): they tend to be more marked in successive lactations; when they become excessive and the milk yield declines abnormally "non-specific mastitis" is considered to exist. Concurrently the normal udder flora and the leucocyte count tend to increase but it is claimed that the condition is unassociated with any of the recognised pathogens including *Str. agalactiae* and haemolytic staphylococci. When once established "non-specific mastitis" is very persistent and often continues from one lactation to the next. There is little evidence that the disease is due to a virus or even that it is transmissible, although Broadhurst *et al.* (1939) claim to have isolated a filtrable virus from the milk of cows affected with mastitis and to have demonstrated inclusion bodies. [In parenthesis it may be noted that grossly abnormal samples of milk from cows with acute mastitis are at times bacteriologically sterile.]

Minett (1937) has shown that chronic mastitis may be caused by the presence of very small numbers of haemolytic staphylococci. In a study of staphylococcal mastitis Plastridge *et al.* (1939) state that they have not encountered "non-specific mastitis" as described by Peterson *et al.* (1938) and express the opinion that the condition is due to a staphylococcal infection.

Whilst it is admitted that a lack of association between "non-specific mastitis" and any of the udder pathogens has not been completely proved, the results of Peterson and Hastings (1939) appear to be significant. They review the literature supporting the hypothesis that chronic streptococcal mastitis is the product of two factors, namely, a lowering of resistance due to "non-specific mastitis" followed by streptococcal infection, and describe experiments carried out on nine cows affected with "non-specific mastitis." Four of these cows were in their second and three in their third lactation, whilst two were old cows. Cultures of freshly isolated strains of *Str. agalactiae* were smeared on the teats. The maximum number of times any one teat was exposed was four, and the average number was 2·9. By this means nine of the 34 quarters, all of which were affected with "non-specific mastitis," became infected with streptococci. As far as is known such successful results have not been recorded by other workers and it must be assumed that there was some factor which lowered host resistance and allowed the very small number of streptococci which passed through the teat canal to multiply and gain a foothold in the udder parenchyma. It is, of course, just possible that this predisposing cause was a staphylococcal infection.

Little (1939) appears to accept the existence of "non-specific mastitis" as described by Peterson *et al.* (1938), and considers that this alteration in the normal constituents of the secretion may in some way influence the efficacy of the bactericidal substances present in normal milk, thus lowering the resistance of the udder. He considers, too, that forced high milk yields may also reduce resistance.

The morbid histology of "non-specific mastitis" has been studied by Peterson, Hastings and Hadley (1938) and Peterson and Hastings (1939). In affected glands the parenchymatous epithelial cells appear to degenerate and become smaller, due to partial loss of cytoplasm. The alveoli become obliterated and there is an overgrowth of intralobular connective tissue with proliferation of fibroblasts, macrophages and plasma cells. There is also a lymphocytic infiltration of the subepithelial connective tissue but polymorphonuclear leucocytes are seldom seen. These changes extend to some extent along the smaller ducts but proliferation of the interlobular connective tissue is less marked. It must be admitted that it is difficult or impossible to distinguish the pathological picture of "non-specific mastitis" from that of streptococcal mastitis as described by Morill (1938), Gibbons (1938), or of staphylococcal mastitis (Minett, 1937) and udder inflammation caused by Brucella infection (Sholl and Torey, 1931). As Peterson and Hastings (1939) have stated the only marked difference is the lack of polymorphonuclear leucocytes in "non-specific mastitis."

Far less attention has, however, been paid to the morbid histology than to the bacteriology of mastitis. This is perhaps due to the inherent difficulty of the subject, for as Creighton (*cit.* Dawson, 1934) has pointed out when considering the pathology of mammary tumours: ". . . there is no uniform standard of normal structure and function from which to deduce the pathology, but an amount of variation from time to time and from individual to individual which is without parallel in any other organ in the animal body." There is, however, much scattered information available upon which further work to elucidate the problem could be based. For example, special methods of dealing with the udder at *post-mortem* examination have been described by Schalm and Haring (1939), and Miller and Johnston (1939) have described a rapid method of demonstrating the extent of fibrous tissue changes in the udder. Dawson (1933, 1934) has described the changes which occur in normal and abnormal mammae in the human subject and has given very precise definitions of the terms which can be used in mammary histology. A good description of the histology of the bovine udder has

been given by Holm (1937). Kwong (1940), Venzke (1940) and Foust (1941) have described the anatomy and histology of the teat. The anatomy, histology, development and certain aspects of the physiology of the bovine udder have been described in great detail by Turner (1939).

Whilst considering the pathology of mastitis it is interesting to compare it with that of various other conditions which are encountered in the mammary gland of animals and man. Turner and Reineke (1936) have developed a biopsy technique for the study of the caprine mammary gland, and have found that the involutionary changes following cessation of milking and those of advanced lactation consist of degenerative changes in the epithelial cells and an overgrowth of connective tissue. It also appears from the work of Turner and Gomez (1936), at least as regards the relative proportion of epithelial and connective tissue elements, that during development the udder passes through a similar but reversed series of changes. A study of the microphotographs in the article by Turner and Reineke (1936) shows that some of them bear a strong if perhaps superficial resemblance to the microphotographs of " non-specific mastitis " (Peterson, Hastings and Hadley, 1938; Peterson and Hastings, 1939). It is probable that the histological changes in declining lactation are similar in the bovine to those in the goat, and Little (1939) and others have shown that the chemical changes in the milk during declining lactation are the same as in " non-specific mastitis."

There is a condition of the human breast known as " chronic mastitis," admittedly a misnomer, the pathology of which has been described by Dawson (1933, 1934). The condition is essentially an adenosis which is often difficult to distinguish microscopically from the glandular increase of early pregnancy. Atkins (1939) has, however, stressed the fact that proliferative fibroblastic changes are an outstanding feature of the condition which has been largely overlooked. He considers it as easy to distinguish breasts affected with " chronic mastitis " from normal breasts by fibrous tissue changes as it is by epithelial changes. Some of the microphotographs published by Dawson (1933) illustrating this condition resemble those of " non-specific mastitis " and the involutionary and developmental changes in the udder of the goat. " Chronic mastitis " in women is not associated with any bacterial infection. It occurs in the non-pregnant subject and is commonest at the age of 33 although it occurs in all age groups. It is accompanied by pain and lumpiness of the breast which may be continuous or intermittent, commencing seven to ten days before the onset of the menstrual flow when the oestrogen content of the blood is at a maximum. The disease is ameliorated after the onset of pregnancy and after the menopause, despite the fact that the hormonal effects of these conditions are different (Spence, 1939, and Atkins, 1940). The consensus of opinion is that the condition does not predispose to carcinoma. The aetiology and treatment of this condition have been reviewed in a recent article in the *Lancet* (1940). It is pointed out that the physiological activities of the mammae are under hormonal control and that in animals oestrogens have produced changes closely resembling those of " chronic mastitis " in woman and it is rather definitely concluded that the condition is due to an excess of oestrogens. Clinical reports are cited which show that testosterone propionate relieves the condition, it is suggested, by its effect in reducing the output of gonadotrophin by the pituitary, but it is more effective when applied by local inunction of the breast.

The following conditions have now been described and it has been claimed, judging largely by microphotographs, that they all have a similar pathological picture :—

(1) " Chronic mastitis " in women, which is stated to be due to an excess of oestrogens.

(2) The effect, under certain conditions, of oestrogens in experimental animals.

(3) A phase in the development of the mammary gland of the goat and woman.

(4) The involutionary changes in advanced lactation and those following cessation of milking in the goat.

(5) " Non-specific mastitis " in the bovine and by inference the conditions associated with advanced lactation in that animal.

The first three of these conditions are all probably due to the action of oestrogens. " Non-specific mastitis " and the conditions associated with declining lactation have been claimed to increase the susceptibility to *Str. agalactiae* infection, the pathology of which only differs from that of " non-specific mastitis " by an increase in the number of leucocytes.

The question now arises : is the susceptibility to mastitis, which is generally considered to be greater in dairy than in beef cattle, in part due to a certain hormonal imbalance or to an exaggerated sensitivity of one or more quarters to certain hormones ? It has been shown that the anterior pituitary glands of dairy cattle contain more lactogenic hormone (Reece and Turner, 1937) and more of the duct growth factor, which is an oestrogen effect (Lewis and Turner, 1939), than do those of beef breeds.

The hormonal control of the mammary gland has been reviewed by Nelson (1936), Smith (1937 and 1939). The hormones of the ovary and corpus luteum and also probably those of the adrenal cortex and the placenta are all concerned. Folley (1940) has reviewed the whole subject of lactation including the recent evidence which suggests that both the duct-stimulating and the lobule alveolus-stimulating actions of oestrone and progesterone may be indirect and that these substances act by stimulating the anterior pituitary to secrete specific hormones. The rôle of the oestrogens in lactation has been reviewed by Folley (1941), and it appears that they stimulate growth of the mammary gland and milk secretion when given in small doses and inhibit both when given in large doses. Folley (1936) has shown that the milk yield of cows can be reduced by large doses of oestrogens, the reduction being maintained only whilst there is a high oestrogen content in the blood. It is possible that declining lactation and " non-specific mastitis " which is associated with a fall in milk yield are in part due to the action of oestrogens.

It is realised that the existence of " non-specific mastitis " is still questioned by some authorities and the view advanced that the increased susceptibility to infection by *Str. agalactiae* is due in part to hormonal imbalance is even more problematical. There are, however, reasons for considering the possibilities of causes predisposing to infection of the udder tissue by *Str. agalactiae*.

Shope (*cit.* Hastings and Peterson, 1940), in a discussion of seven of the " complex infections," has

emphasised that in the case of each one of them a one agent causation was originally considered to be probable or even proved. He believes that those studying infectious diseases find it difficult to abandon, even occasionally, the concept that for each infectious disease there must be a single specific aetiological agent. He further emphasises that an infectious agent must fully explain and account for all the features of a disease with which it is associated before it is accepted as the sole cause of the disease.

It has already been stressed that the method of spread and pathogenesis of chronic streptococcal mastitis is not fully understood. One feels, therefore, that it is legitimate to consider all possibilities, and in this review an endeavour has been made to bring together a number of somewhat unrelated facts which are thought to have a bearing on the problem. Even if, as is quite likely, the views advanced prove to be incorrect, it is hoped that they will give rise to further thought and discussion on the relationship between physiological conditions in the udder and infection by *Str. agalactiae*.

A careful bacteriological study in an experimental herd, as carried out by Munch-Peterson *et al.* (1940), together with a biochemical study similar to those reported by Hastings and Beach (1937 and 1939), and Hastings and Peterson (1940) appears to be the only method of approach to the problem likely to afford a solution. Concurrent pathological studies would also have to be carried out at *post-mortem* examination or by means of a biopsy technique. It is thought that a study of this nature, together with increasing fundamental knowledge on the physiology and histology of the udder, would throw considerable light on the problem under review.

Summary

The pathogenesis of chronic bovine mastitis still remains obscure in many respects despite the large amount of work done upon the bacteriology of this disease.

The invasion of the udder tissue with *Str. agalactiae* probably depends, in part at least, upon the state of the teat sphincter because any derangement of its normal function may facilitate the passage of streptococci into the milk cistern. It will also probably depend on variations in the susceptibility to infection of the udder tissue itself, but very little attention has hitherto been paid to the significance of such variations.

Experiments have shown that although comparatively small numbers of streptococci inserted through the teat canal may gain a foothold in the udder, the external application of large numbers of these organisms to the undamaged teat seldom produces infection. It has been claimed, however, that when a pre-existing condition of " non-specific mastitis " affects the udder streptococcal mastitis can be set up by the external application of the specific organisms. This was brought about presumably because the lowered resistance of the udder tissue enabled the few streptococci that traversed the teat canal to establish themselves.

It is now well known that the udder tissue undergoes striking evolutionary and involutionary changes that are dependent upon fluctuations in the concentration of certain hormones, particularly the oestrogens. In the human subject, a non-bacterial condition known as " chronic mastitis " has been ascribed to an excess of oestrogens. It is claimed in this review that the histological picture of " non-specific mastitis " in the bovine resembles that of " chronic mastitis " in women, the changes produced by the experimental administration of oestrogens, and certain stages in the normal evolutionary-involutionary changes of the udder. The opinion is therefore expressed that all these changes depend, at any rate in part, on the action of oestrogens.

The biochemical changes in the milk in so-called " non-specific mastitis " and in declining lactation when the udder is in an involutionary stage, are similar. These two conditions have been claimed to increase susceptibility to *Str. agalactiae* infection.

Whether a state of " non-specific mastitis " induced by hormonal factors constitutes a precursor to subsequent streptococcal infection is at present wholly unproved. The evidence suggesting that there is such a pre-existing state has, however, been examined in this review, and it is considered that the subject is worthy of further investigation.

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Economy in the Use of Spirit

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The attention of veterinary surgeons and others is drawn to the urgent necessity for strict economy in the use of alcohol in any form, whether in research or other laboratories, in teaching institutions or in general veterinary practice.

While it is fully recognised that spirit may be essential for many purposes, it is hoped that this necessity for strict economy will be constantly borne in mind.

Considerable amounts of alcohol or alcoholic preparations are used in general veterinary practice for internal medication. Much of this can be saved without prejudice to the patient, and veterinary surgeons are asked to consider the use wherever possible of some alternative, such as ammonia preparations for alcohol as a diffusible stimulant and watery solutions instead of alcohol for the preparation of " tinctures " from extracts. Similarly, alcohol can be frequently dispensed with for external applications, and this should be done wherever possible.

In relation to this subject it is felt that the following abstract from a statement issued by the War Wounds Committee of the Medical Research Council will be of value to veterinarians :—

" The use of spirit is an unreliable method of sterilising instruments, and should be abandoned. Dry heat, where available, is the best method for most instruments composed only of steel or glass; the instruments should be sterilised in dust-proof containers. Failing the dry heat method, every instrument suitable for boiling should be sterilised by that means *immediately before use.* Syringe needles should be boiled. It has been confirmed that boiling in 2 per cent. sodium carbonate for five minutes is lethal to all types of bacteria, including spores. Boiling for two minutes is adequate for most purposes, but wherever spores may be present—as after an operation for gas gangrene—boiling should be continued for fully five minutes. Moreover, recent tests, as well as the experience of many surgeons, have indicated that the widespread view that boiling blunts the edges of surgical knives has little or no foundation. It is important, however, to protect the edge from mechanical damage by contact with other instruments during boiling; this can be done by the use of a rack to hold knives during boiling, or by wrapping the knives in gauze or lint before they are placed in the steriliser.

(*Continued over-leaf.*)

"The use of spirit for *storing instruments after sterilisation* should be drastically curtailed. Where boiling immediately before use is likely to be impracticable, the sterilised instruments should whenever possible be kept in the dry state in a covered sterile receptacle or sterile towels. Where this cannot be done, *Liquor Formaldehydi Chirurgicalis* is suitable for the storage of most instruments; it consists of Borax 1·5, Solution of Formaldehyde 2·5, Phenol 0·4, Distilled Water to 100; the borax completely prevents rusting of steel instruments kept in the solution for a week or more. Instruments kept in this solution need to be rinsed before use, and, because of its formalin content and alkalinity (*p*H over 9), the solution is not recommended for the storage of hypodermic syringes or needles. For syringes and needles likely to be required for urgent use, storage in small quantities of spirit may still be permissible, but as a general rule syringes and needles (if of rustless steel) should be kept in the dry state after boiling. Glass instruments such as thermometers may be kept in a 1 per cent. sodium hypochlorite solution (in a covered container), or in 1 per cent. phenol.

"The use of spirit for the preparation of the surgeon's hands before operation can be avoided altogether if, after washing with soap and water for three minutes, the hands are dried on a small sterile towel before the gloves are put on; a stock of these towels should be kept in the same sterile drum as the gloves. Since the chief use of spirit is for drying the hands, and the alternative process certainly takes longer, a good supply of French chalk must be provided for each pair of gloves. The practice of keeping a bowl of spirit for the surgeon to rinse his hands in during an operation should be prohibited. If spirit is used at all for drying the surgeon's hands, it should be applied economically by means of a dropper or spray.

"The use of alcoholic solutions—*e.g.*, tincture of iodine—for the preparation of the patient's skin for operative incision can be avoided altogether. The following alternative technique is recommended, the antiseptics mentioned having been subjected to practical trial against bacteria on the living human skin: (*a*) the area of the operation is washed thoroughly with soap and water, using a gauze swab; (*b*) the area of the operation is dried with another gauze swab; (*c*) the area is painted with *Liquor Antisepticus* N.F.* or with a watery solution of either iodine (2 per cent. in solution of sodium iodide 2 per cent.), or a watery solution containing brilliant green (0·5 per cent) and crystal violet (0·5 per cent.).

"It is essential to delay for at least three minutes before making the incision, so as to allow time for the antiseptic solution to act, and to dry on the skin.

"The custom of swabbing spirit over the suture line when stitches are removed after clean operations should be abandoned for the duration of the war. *Liquor Antisepticus* N.F.* may be used instead for this purpose. As an alternative to a liquid antiseptic, sulphanilamide powder may be applied."

* Obtainable from any wholesale drug house, or one of its proprietary equivalents as listed on pp. 30-37 of the *National Formulary for National Health Insurance Purposes*, Third Edition, 1939, may be used.

Weekly Wisdom

The modern habit of saying "This is my opinion, but I may be wrong" is entirely irrational. If I say that it may be wrong I say that it is not my opinion.—Introd. to "Book of Job" by G. K. Chesterton.

THE VETERINARY RECORD

July 12th, 1941.

THE NATURAL TRANSMISSION OF CHRONIC BOVINE MASTITIS

TIME was, within the recollection of older workers, when at the beginning of the bacteriological era, the spate of discoveries concerning the aetiology of well known diseases made it seem almost certain that it would soon turn out that every infectious disease or, better, any inflammatory disease could be ascribed to the bacterium discoverable in the tissues of the diseased subject, and to that bacterium alone. Something in the way of a check upon the ready acceptance of the discoverable bacterium as the true cause was provided by the logic of what are known as Koch's postulates (originally enumerated in much the same form by Henle but applied brilliantly to his own work by Koch). We say the logic and not the letter because in the veterinary domain there come to mind several diseases for which nothing more than the mental process known as commonsense commands acceptance of certain bacteria as the causal agents, although the strict logic of Koch's postulates cannot be satisfied. Examples are blackquarter, pleuropneumonia, and haemorrhagic septicaemia in cattle. Warning was supplied early, however, by the swine fever story, that a bacillus found in pure culture in the tissues need not be the primary aetiological agent, for in this case it was found some years later that the disease was due in the first place to a virus. Swine fever is now known not to stand alone, and the brilliant studies of Shope on swine influenza, which have been confirmed and amplified by workers elsewhere than in America, are furnishing evidence upon the variety of factors that seem to be cumulatively necessary sometimes to set up artificially a disease corresponding in all its features with the natural disease.

The mechanisms of natural transmission seem to be surprisingly complicated. Some years ago, for example, the Australian worker Sydney Dodd showed in his pioneer studies upon "black disease" of sheep in Australia that, for the anaerobe (*C. oedematiens*) to "light up" in the tissues so as to commence the naturally rapidly fatal disease, the trauma caused by the passage through the liver of immature flukes was a necessary primary "insult." Shope's studies suggest that in some other diseases "insults" may be still more numerous, varied, and interlocked than in this example.

An immense amount of work has now been done upon the bacteriology of the common form of bovine mastitis. Thanks to these researches and fundamental serological studies of streptococci in general, we have very precise knowledge upon the taxonomy of the streptococci that can be isolated from diseased udders. For many years, however, it has been in

the mind of many workers on mastitis and a few contemplative students of animal pathology that the sole "insult" to the udder tissue in the common form of bovine mastitis is not *Str. agalactiae*. For various reasons, which are given in the review published in this issue, studies other than those of a bacteriological character have been difficult to carry out, and the recorded results of experiments on the transmission of the disease have not proved beyond doubt that the streptococcus is alone responsible or that the means by which it gains access to the tissues naturally are thoroughly understood. However, any views on the nature of the contributory factors other than the clearly demonstrable streptococcus would have had to be dismissed as sheer speculation until very recently when much suggestive work has become available. Advances in endocrinology coupled with knowledge from histological studies upon the mammary tissue during evolution and involution point to the probable effects of oestrogens in accentuating certain phases in this process which may then lead to the appearance in the human female of a condition, designated as "chronic mastitis," but which is not followed by bacterial invasion. A condition, called "non-specific mastitis," which bears certain similarities has been reported by American workers in cattle. It is, therefore, feasible to accept as a possibility that in the bovine female there is a primary "insult" to the host in the shape of a similar profound physiological or functional disturbance, that is, of endocrine origin, which renders the udder tissue of the high yielding dairy cow especially prone to the further assault represented by the streptococcal invasion. Obviously it is only the results of further scientific work that can show whether or not the hypothesis is valid.

WARNING ON THE USE OF SALVAGED FEEDS

In a report to a recent meeting of the Executive Committee of the Royal Agricultural Society of England, Mr. Eric Voelcker, the Consulting Chemist, issued a warning on the use of salvaged feeding-stuffs. The advisability of using damaged grains as food for stock can, he says, only be decided by very careful examination of the whole bulk.

"In one case I heard about recently," he remarks, "the sample was good, but when the order was delivered it in no way compared with the sample and was quite unsuitable even as scratch feed for poultry. The delivery of such material is a waste of time and money, as it all has eventually to be destroyed."

The report states that during the first four months of this year samples described as reconditioned salvaged soya, salvaged groundnuts and salvaged wheat were examined. In only one case, that of wheat which had been fire-damaged, was the food usable at all for feeding purposes. The groundnut and soya samples were found to be foul-smelling, very acid and "quite unsuitable to be used even in small quantities."

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A farmer was fined £40, a farm foreman £16 and a butcher £50, with total costs of £11 6s. at Colchester, when charged with being concerned with the illicit slaughter of calves. The carcases were ordered to be handed over to the Ministry of Food.

CLINICAL COMMUNICATION

Suspected Tetanus in Cattle

F. R. SPRATLING, M.R.C.V.S.,
READING, BERKS

CASE 1. *Subject.*—Shorthorn heifer, aged 2½ years. *History.*—On February 22nd last she aborted at about the sixth month of pregnancy and retained the placenta.

February 28th, 1941.—I was called in to remove the placenta, which was very rotten and evil-smelling and accompanied by the usual copious, foul, reddish uterine discharge. It came away easily. Two pessaries (creosalgen and iodoform) were inserted into the uterus. The heifer was then in rather poor condition and suffered from slight diarrhoea and capricious appetite.

March 10th, 1941.—I was called to see her again. The owner said that her appetite had not improved since my previous visit, and that during the last 24 hours she had neither eaten nor ruminated. For the past two days (March 8th and 9th) she had suffered from ruminal tympany and during the last 24 hours he had noticed that she was passing only very small quantities of urine.

I found her lying down, but as I entered the shed she scrambled stiffly to her feet. Her eyes were staring. She was much thinner and stood with back arched and tail "carried," and was not easily persuaded to walk. There was an obvious yellowish vaginal discharge and her rumen was considerably distended with gas. I was able to open her mouth about 2 inches only. On raising her head, the third eyelid came partly across the eye. Rectal examination revealed considerable distension of the bladder and the manipulations in the vagina and about the perineum resulted in only a few ounces being voided.

On these findings I diagnosed tetanus, and advised slaughter.

Post-mortem Examination.—This revealed no lesions in the stomach or bladder. There was endometritis, the uterus containing 5 to 10 ozs. thick yellow pus and a partially disintegrated iodoform pessary, which must have been inserted by the owner, as I use a different type of pessary.

Remarks.—I do not know whether the abortion was due to brucellosis, but the necrosis of the cotyledons suggested this.

No bacteriological examination was made and there is thus no proof that the beast was suffering from tetanus, but the clinical findings seemed to me diagnostic. The uterus was the only infected focus I could find and must therefore be considered the probable channel of entry of the tetanus infection, if present.

On February 28th I found that the heifer's diarrhoea and straining against my hand made it very difficult to avoid faecal contamination of the genital tract, and I think this the most probable source of infection. I would point out that the owner, as well as I, inserted his hand into the uterus and that therefore I was not necessarily the cause of the trouble!

CASE 2. I recall seeing a probable case of tetanus in a bull last year, in Somerset. The bull had torn

(*Concluded at foot of col. 1, page 402.*)

ABSTRACTS

[I. NUTRITIONAL REQUIREMENTS OF DOGS. Earle, Imogene P. (1939.) *Food and Life (U.S. Dept. Agric. Yearbook for* 1939), pp. 844-855.
II. FEEDING DOGS. Speelman, S. R. (1939.) *Ibid.*, pp. 856-870.
III. DEFICIENCIES AND FALLACIES IN CANINE DIET. Morgan, Agnes F. (1940.) *N. Amer. Vet.* **21**. 476-843 (Discussion, pp. 484-486).]

[The dog has been used throughout the whole period of modern physiological research, and many of the basic facts of nutrition have been discovered with the aid of this species. It is evident that in the U.S.A. extensive attempts are being made to acquaint the veterinary practitioner with the results of current research involving the dog, and to enable him to assess their practical implications. Of the three articles abstracted below, the first deals with the theoretical requirements of the dog, the second is concerned with practical directions for dog-feeding, and the third is an account of an interesting discussion held by the American Animal Hospitals Association.]

I. The naturally carnivorous dog has for the most part become omnivorous as a result of domestication, and has in many instances less opportunities for exercise or for access to sunlight than had his wild forbear. Much information concerning the nutritive requirements of the species has been made available from the use of the dog as a laboratory animal, and during recent years a great industry has arisen for the preparation of dog foods. Despite these facts, there is much controversy over the feeding of dogs, although most veterinarians are of the opinion that meat is the essential basis of all successful diets. Nevertheless, greyhounds are fed relatively large amounts of vegetables which are cooked and fed as slop, and many laboratory workers have demonstrated that dogs may be maintained quite satisfactorily on meat-free diets.

Physiology of Digestion in the Dog.—The teeth of the dog are typical of the carnivore and the food is bolted without chewing or digestion in the mouth. The stomach is large in relation both to body size and to the capacity of the intestines; its pyloric sphincter is powerful, and does not normally permit of the passage of food until gastric digestion is complete. The gastric juice is similar to that of man, but has higher concentrations of HCl and of pepsin. Only proteins are significantly affected by gastric digestion, carbohydrates and fats being digested almost entirely in the small intestine. Absorption is believed to take place largely from the small intestine, the function of the large intestine being to permit of the absorption of water and to store a limited and compact bulk of waste material. The short alimentary tract of the dog is best adapted to an easily-digested concentrated diet which does not leave much residue. In other words, foods of animal origin are admirably suited to the dog's digestive physiology.

Utilisation of Carbohydrates.—Although it is commonly believed that dogs do not tolerate a diet rich in carbohydrate, it has been abundantly proved that they can digest large quantities of starch without ill effect. It seems probable that any unfavourable results obtained with a high-starch diet are due not to the starch itself but to some imbalance or deficiency of minerals, vitamins or proteins, or to the presence of excessive quantities of fibre. Different workers have found considerable variation in the ability of the dog to digest crude fibre, and it is believed that this may be due to variation in the intestinal flora. The apparent anticalcifying action of cereals is mentioned, *i.e.*, Mellanby's observation that a diet containing just sufficient Ca, P and vitamin D to allow of normal bone building in growing puppies produced rickets when it included a large proportion of cereals. This action is believed to be due to the combination of Ca with the compound, phytin (or its derivatives), present in cereals, and is believed to be abolished by the presence in the diet of large quantities of fat. Carbohydrates are a cheap source of energy.

Proportions of Carbohydrate and Fat.—The ratio of fat to carbohydrate may be varied within wide limits provided the requirements for proteins, minerals and vitamins are met.

Protein Requirements.—There is evidence that the biological value of proteins is decreased by heating, especially to high temperatures. This fact is of considerable practical importance in estimating the value of protein in commercial dog foods. The plant proteins in general are apt to be deficient in one or more of the essential amino acids, and some of them, although they will maintain adult animals when fed in large quantities, will not permit the growth of puppies. Good growth has nevertheless resulted when puppies subsequently to weaning have received their entire protein intake from wheat or rye. The question of the relative efficiency of plant and animal proteins is complicated by the question of the B vitamins, and the value of meat and milk products is that they are rich in these substances as well as in protein. A nutritive ratio of 1 : 4 (1 calorie of protein to 4 of carbohydrate or fat) has been found sufficient for growth in small breeds, but in larger breeds better results have been obtained with a ratio of 1 : 2·5 (see also III). One worker has reported that liver is a better source of protein for the lactating bitch than either eggs or round steak.

Energy Requirements.—These vary widely with size, age, activity and condition, but the maintenance requirements of smaller dogs are relatively greater than those of larger ones, and young growing dogs require more food for maintenance than do adult dogs, irrespective of the additional requirements for growth. The puppy requires two or three times as much energy-producing food as an adult dog of the same weight. It is commonly said that the dog should be fed just sufficient to be kept healthy, but not fat, since its normal condition is lean. Although under favourable laboratory conditions dogs have been said voluntarily to adjust their food to their energy needs, it is the general opinion that their appetites are not a

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the ring from his nose a few days before showing inappetence, muscular spasms, partial trismus and reaction to the "third eyelid test." I was not myself concerned in the treatment of this case, but I understand that after a very small dose of tetanus antitoxin and symptomatic treatment for about a week, the bull recovered.

Having seen two probable cases of tetanus in bovines in one year, it has occurred to me that perhaps the disease may be more common in cattle than is generally believed.

reliable guide to the amount of food required. The following adaptation of Dechambre's table was presented by Linton to the 12th International Veterinary Congress :—

Weight of dog		Total Calories for :		
Kg.	Lbs.	Maintenance	Moderate activity	Great activity
5	11	520	680	860
10	22	855	1,140	1,440
15	33	1,080	1,360	1,680
20	44	1,265	1,665	2,120
27	59·4	1,155	2,060	2,620
40	88	2,020	2,670	3,400
50	110	2,330	3,085	3,930
60	132	2,640	3,490	4,450

Mineral Requirements.—Arnold and Elvehjem have assessed the quantitative requirements of the dog for the following eleven minerals (the figures in parenthesis are their estimates of the daily requirements per lb. bodyweight): Calcium (9 mg.), sodium chloride (136 mg.), copper (27γ), iron (180γ), magnesium (4·5 mg.), manganese (18γ), phosphorus (18 mg.), zinc (27γ), potassium (63 mg.), iodine (0·45γ). [Cobalt has more recently been shown as essential for the dog.] Apart from salt, which is necessary for rations containing a large proportion of plant products, it seems probable that only calcium and phosphorus require special consideration when dogs are receiving natural foodstuffs. These two elements and vitamin D are all essential for normal development of bones and teeth, but it has been reported that naturally occurring rickets in the dog is usually of the low-phosphorus type. This is probably due to faulty utilisation of the phosphorus present, and not to an absolute deficiency of the element (see III). A ration consisting of a muscle meat alone, or of muscle meat plus cereals, is apt to be deficient in calcium, and this deficiency may best be compensated for by the addition of milk, bonemeal, ground bone or calcium phosphate.

Vitamin Requirements.—It is being realised more generally that many of the subacute symptoms of general unfitness in dogs may be attributable to an inadequate supply of one or more of these essential food factors. Advanced deficiency of vitamin A leads to marked conjunctivitis and injury to other mucous membranes, while less easily recognised symptoms are retarded growth, loss in weight, and an apparent lowered resistance to bacterial infection, especially of the upper respiratory tract. Nerve lesions, possibly due to local infection, and subsequent lack of muscular co-ordination have been described in A-deficiency, as has deafness in young dogs. Good sources of A are fish-liver oils, liver, green leaves and other green vegetables, kidney, heart, tomatoes, carrots, cheese, eggs, butter and milk. The daily requirement of the dog has variously been assessed as from 10 to 36 I.U. of vitamin A per lb. bodyweight daily. Various B vitamins are known to be essential for the dog. [It is hoped that this subject will receive further attention in these columns at a future date.] Vitamin D is essential, but adult dogs living out of doors probably do not require extra amounts except during pregnancy. The best sources are sunshine, fish liver oils, irradiated ergosterol and egg yolk, and Morgan has recommended that young pups and pregnant bitches should receive half to one tablespoonful per day of cod liver oil or other vitamin D concentrate. The possibilities of overdosage should be borne in mind.

II. *Meats and Other Animal Products.*—Fish makes a satisfactory substitute for meat when given about once weekly, providing it does not contain harmful bones. Tinned salmon is especially valuable. Milk and milk products are valuable meat substitutes, as are eggs in the case of young animals especially. Meat should not be fried, and if cooked in other ways it is better first to immerse it in boiling water in order to close the cellular structure of the outer surface and then to cook slowly. Broth and meat juices should be utilised. Many believe that it is good policy to begin meat feeding early, and that at first about a teaspoonful of well-minced raw lean beef may be given once daily. The meat allowance should be increased gradually, and in small breeds, which are usually mature at one year, the full meat ration may be given at four to six months. In the larger, more slowly-maturing, breeds the time is usually delayed. Cow's milk is fed unmodified except to young puppies. As a practical guide it is recommended that about 50 per cent. by weight of the ration of mature dogs should consist of meat or meat substitutes, and that this figure be increased to 65 to 75 per cent. for puppies and for pregnant and lactating bitches. [The value of liver might have been stressed.]

Vegetables.—Root vegetables contain large amounts of indigestible cellulose, and must be cooked in order to liberate the starch for digestion. Vegetables should be mixed thoroughly with the ration, otherwise many dogs will refuse to eat them. The extensive use of vegetables of high fibre content is to be avoided, but providing the dog tolerates them, vegetables may be fed up to 25 per cent. of the ration. It has been found that the inclusion of small quantities of sugar beet pulp or bonemeal tends to correct any excessive looseness caused by vegetable feeding.

Cereals and Cereal Products.—The actual cereal grains are not usually relished by dogs. In the U.S.A. it is, apparently, possible to obtain at a cheap rate portions of breakfast foods which have become broken or crushed during manufacture. Bread is a useful article of diet [and, it may be added, an excellent source of protein as well as of other dietary essentials; wholemeal bread as eaten contains about 8 to 9 per cent. protein]. Dog biscuits are included in this category of cereal foods, which may satisfactorily constitute up to 25 per cent. of the ration.

Canned Dog Foods.—These vary widely in quality, but in general consist of a cooked combination of meat or its by-products, fish or fishmeal, cereal products, vegetables, mineral matter and various accessory substances such as cod liver oil, yeast or charcoal. Many have a high moisture content, 65 to 75 per cent. or more. Some are used as complete dog rations.

Bones.—These are valuable during teething, and are a good source of calcium and phosphorus, but the use of some bones is dangerous, and excessive bone feeding is liable to cause constipation and to wear the teeth unduly. Steamed bonemeal, which is required in only very small quantities, is a suitable source of calcium and phosphorus.

Water.—Plenty of fresh, clean water should be provided, and separate containers should be provided whenever possible.

Feeding the Brood Bitch.—During the early stages of pregnancy the normal two meals a day should be continued, with slightly increased quantities of food, but later three or four meals a day should be given, until in the last month the bitch is receiving about twice as much food as before conception. It is often recommended that bulky foods be avoided during the last week, and that a mild laxative, such as milk of magnesia, be included at this time. For the three days following parturition, the diet should be laxative in character, moderate in quantity and light in composition. A gradual return should then be made to a ration similar in quantity to, but perhaps with less vegetable or other bulky matter than, that of late pregnancy. The food requirements will increase during the lactation period, and milk is a particularly valuable food at this time (as it is during pregnancy). The time taken to return to a normal maintenance ration will depend upon the bitch's condition at the time her puppies are weaned.

Feeding the Stud Dog.—The aim should be to keep bodyweight uniform and condition excellent. If extensive use is being made of the dog, his allowance of meals should be increased to three a day, and eggs, meat and milk should form a prominent part of the ration.

Feeding Puppies.—If necessary, new-born puppies should be placed at their dam's teats for the first nursings, in order to ensure that they obtain colostrum. Supplementary feeding may be commenced at three weeks and, in addition to minced meat, raw eggs beaten up in milk, unsweetened evaporated milk and non-greasy broths poured over bread are recommended. After weaning, which should be relatively easy if supplementary feeding has been carried out carefully, five or six meals a day should be provided. The meals should be cut down in number gradually, until at one year in smaller breeds, and later in the larger ones, two meals only are being given. During the growing period access to food should not be at will but at regular intervals, and food not consumed within ten minutes should be removed. Individual feed pans are recommended. Liberal allowances of meat or of the meat substitutes indicated above should be provided. Small quantities of cod liver oil are advocated, during the winter months especially.

Quantities of Food Required.—The following table, based on home-mixed rations consisting of meat, fish, eggs, milk and good quality cereals, and comprising some 50 per cent. animal protein foods, 25 per cent. vegetables and 25 per cent. cereals, is given as a guide to the normal daily diet of mature animals. Working dogs may require up to 25 per cent. more than the quantities stated, and inactive animals need correspondingly less.

Bodyweight in lb.	Total food (wet basis) (lb.)	Food per lb. bodyweight (oz.)
1	¼	2·00
10	¾	1·20
25	1½	0·96
50	2½	0·80
75	3¾	0·70
100	4	0·64
150	5¼	0·56
250	7	0·50

III. Because the wild dog is largely carnivorous, it does not follow that " meat " (usually muscle, blood meal, lungs or tripe) forms an adequate diet under conditions of domestication. The wild carnivore eats first the liver of its prey, and then partakes of the other viscera, bones and blood in addition to the muscles. Muscle meat is known to be deficient in calcium and in vitamins A, D, and some of the B group; these substances are supplied by the viscera and bones. The author has found high levels of protein for growing puppies, and the purified diet which she employs in this connection supplies 22·9 g. protein and 216 cals. per kg. bodyweight daily, and has a nutrient ratio of 1 : 2·4. It has been demonstrated quite clearly that casein alone can supply all the protein requirements of the dog. Horseflesh and beef are almost identical as a source of protein.

The needs of the dog for vitamin D appear to vary considerably and, under certain conditions, are very high. Certain types of large dogs almost invariably develop rickets during a certain stage of growth, and Morgan asserts that every photograph she has yet studied of prize-winning specimens of certain breeds has shown evidence of healed rickets in the animal concerned. A recently observed premonitory sign of rickets is a peculiar arching of the neck. [Where rickets is due to a low-phosphorus diet, or develops from cereal feeding, parathyroid extract appears to be of value.] Dogs are very susceptible to vitamin A deficiency, and many commercial foods appear to be deficient in this vitamin or in its precursor carotene. An interesting aspect of vitamin B_2 deficiency has been demonstrated. Dogs which are receiving B_1, B_6 and riboflavin still require nicotinic acid and " filtrate factor." If nicotinic acid alone is given to such animals, their condition deteriorates much more rapidly than when both factors are withheld.

A. N. W.

MILK RECORDING: PLEA FOR RESUMPTION OF GOVERNMENT SUPERVISION

Owners of herds of dairy cattle who are members of Milk Recording Societies belong to those bodies mainly for the information that milk recording reveals. They therefore commence culling poor-yielding animals as soon as these are shown by the records to be expensive feeders. No herd owner of milk-recorded dairy cattle would breed from animals he knew to be poor yielders. Without milk recording it would be almost impossible to tell from the animals in milk in a dairy herd which it would be better to fatten out and discard, and quite impossible to do this in respect of dry cows or of young stock of doubtful breeding.

Bearing in mind the above facts, the Cambridgeshire and District Milk Recording Society (including Hunts and the Isle of Ely) management committee have sent the following resolution to the Minister of Agriculture:

" That this meeting of herd-owners who have had considerable experience of the work of a Milk Recording Society in connection with the breeding, feeding, and management of dairy cattle, strongly urges the Minister of Agriculture to allow the Ministry's Livestock Officers to resume as soon as possible the duty of supervising the records of officially milk recorded herds, as done formerly under the Ministry's Improvement of Livestock Scheme —with or without financial grants to the official Milk Recording Societies."

Royal College of Veterinary Surgeons

ANNUAL GENERAL MEETING

The 98th Annual General Meeting of members of the Royal College of Veterinary Surgeons was held at the Royal Station Hotel, York, on Friday, June 20th, 1941, the President, Mr. John Holroyd, being in the chair.

There were also present: Messrs. W. Andrew, J. Clarkson, Professors J. F. Craig, T. Dalling, Messrs. H. W. Dawes, G. W. Dunkin, C. Harvey, W. W. Lang, J. W. Lazenby, G. H. Livesey, J. W. McIntosh, G. P. Male, A. B. Mattinson, Professor W. C. Miller, Messrs. T. M. Mitchell, W. Nairn, Sir Arthur Olver, Messrs. J. O. Powley, J. W. Procter, Dr. J. Share Jones, Messrs. Arnold Spicer, H. W. Steele-Bodger, H. Sumner, W. K. Townson, Dr. A. W. Whitehouse, Mr. J. Wilmot-Smith, Professor G. H. Wooldridge and Dr. W. R. Wooldridge.

The PRESIDENT said at the outset that he would like to express how very much he appreciated such a large attendance at the Annual Meeting. It was a long time since they had had so large and representative an attendance as that day. He then called on the Secretary to read the notice convening the meeting.

The Secretary read the notice as it appeared in the *London Gazette* on May 20th.

The minutes of the previous Annual General Meeting were read and signed as a correct record.

Letters of apology for absence were received from Professor Buxton, Colonel Brittlebank, Mr. J. F. D. Tutt, Sir John Kelland, Colonels Mulvey, Simpson, and Walker, Mr. Wilson, Professors Wright and Browne, and Brigadier A. C. Murray.

Election of Irish Representative.—The Secretary announced that the Returning Officer of Eire reported that Professor T. G. Browne had been declared the "general elected member" for Eire on the Eire Veterinary Council, and in consequence took his place as a member of the Council of the Royal College of Veterinary Surgeons in succession to Professor J. J. O'Connor who had not sought re-election as a "general elected member."

Annual Report and Statement of Accounts.—The Annual Report which had previously been circulated to all members, was considered page by page. On the paragraph relating to the amalgamation of the Army Veterinary Services with the Remount Services the Secretary read the following extract from a letter received from the Director who was unable to be present at the meeting:—

". . . I am deeply grateful to the Governing Body of the profession for their kind reference to the work of myself and my staff, and I am indeed proud of all those members of the Corps, Territorial as well as Regular, who by their sterling work and loyal co-operation over many years in peace and war, have contributed mainly to this achievement. The terms in which the Council have been good enough to express themselves will serve as an incentive to us all to discharge our fresh duties faithfully and efficiently and to justify the confidence which the Army Council and the profession have placed in us.—C. A. MURRAY."

This extract was greeted with applause.

Mr. J. CLARKSON moved, and Mr. W. K. TOWNSON seconded, the reception and adoption of the Annual Report and Statement of Accounts.

Mr. LIVESEY suggested that when the report of the meeting was published it should be pointed out that the draft Veterinary Surgeons Amendment Bill is still under the consideration of the Council, and that the draft Bill would be submitted to the consideration of the whole of the profession before any outside body is consulted with regard to it. The Council desired that it should receive the approval of the profession before it came before the public. He thought that should be clearly understood.

The motion for the reception and adoption of the Annual Report and Balance Sheet was carried unanimously.

Vote of Thanks.—Professor G. H. WOOLDRIDGE moved that a hearty vote of thanks be accorded to the President for his conduct in the chair during a very troublesome year. Those who knew Mr. Holroyd knew the many difficulties with which he had had to contend, both as regards his own health and also the many occasions when difficulties occurred which required immediate decisions. Everyone who knew him knew how well he had carried out the duties and how well he deserved their grateful thanks.

Mr. CLARKSON said that as the oldest Past-President present he should like to be allowed to second that vote of thanks.

The vote was carried with acclamation.

The PRESIDENT briefly thanked the members for the cordial way in which they had carried the vote.

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COUNCIL MEETING

Re-Election of Mr. J. Holroyd as President

A meeting of the Council of the Royal College of Veterinary Surgeons was held at the Royal Station Hotel, York, on Friday, June 20th, Mr. John Holroyd, President, in the chair.

There were also present: Professors J. F. Craig, T. Dalling, Messrs. H. W. Dawes, G. H. Livesey, J. W. McIntosh, G. P. Male, A. B. Mattinson, Professor W. C. Miller, Messrs. T. M. Mitchell, W. Nairn, Sir Arthur Olver, Mr. J. W. Procter, Dr. J. Share Jones, Messrs. Arnold Spicer, H. W. Steele-Bodger, H. Sumner, W. K. Townson, Dr. A. W. Whitehouse, Professor G. H. Wooldridge and Dr. W. R. Wooldridge.

The President explained that this meeting of Council was called under the provisions of the Royal Charter which required such a meeting to be held within 28 days of the Annual General Meeting.

The minutes of the previous meeting, having been printed and circulated, were taken as read and signed by the President as correct.

ELECTION OF PRESIDENT

The SECRETARY submitted the report of the Selection Committee, which recommended the re-election of Mr. John Holroyd as President, and of Dr. A. W. Whitehouse as Vice-President, for the ensuing year. He stated that it was open to the Council to make any other nominations.

No other nomination being made, Mr. NAIRN moved the adoption of the recommendation of the Selection Committee.

Mr. MATTINSON seconded, remarking that he regarded it as a great honour to be allowed to second the nomination.

The motion was carried unanimously with acclamation.

The President said that it was with mixed feelings that he accepted re-election. Last year, on a similar occasion, he had said he hoped that in another twelve months the war would be over. Unfortunately that had not happened, and for that reason he was sorry to have to accept the recommendation. On the other hand he could not but feel a great sense of satisfaction at knowing they had sufficient confidence in him to ask him to carry on for another twelve months. He greatly appreciated the honour they had done him.

Vice-Presidents.—Professor Craig moved that the senior Vice-President, Professor Wooldridge, retain his position for another year.

Mr. Steele-Bodger seconded, and the motion was carried.

Treasurer.—Mr. Nairn proposed the re-election of Mr. McIntosh as Treasurer. Mr. McIntosh had been Treasurer for the last few years and he had many qualities which fitted him for the post. He had the natural features of his race, and he had plenty of time. He was a thoroughly reliable and trustworthy gentleman, and they could have every confidence in him for another year.

Mr. Male seconded. In the South, said Mr. Male, they were just as aware of Mr. McIntosh's capabilities as they were in the North.

There being no other nomination the motion that Mr. McIntosh be re-elected Treasurer for the ensuing year was put to the meeting and carried unanimously.

Mr. McIntosh thanked the meeting for this further vote of confidence in him and assured them he would do his best to carry on for another year.

Secretary and Registrar.—On the question of the election of Secretary and Registrar, the President moved from the chair the re-election of Dr. F. Bullock. He said it would be impossible for the President to hope to carry on without Dr. Bullock as Secretary and Registrar. It was only those who had been through the chair who knew the worth of Dr. Bullock and his value to the College. They had no idea how much he meant to a President.

Mr. Livesey seconded, and the motion was carried with acclamation. The Secretary briefly returned thanks.

The President: "That concludes the business of the first Council Meeting." [A report of the Quarterly Meeting of Council, which followed, will be published in an early *Supplement* to the *Veterinary Record.*—*Editor.*]

H.M. STATIONERY OFFICE PUBLICATIONS

The undermentioned have been published recently. Copies can be purchased through any bookseller, or directly from H.M. Stationery Office, at Hotel Lindum, St. Anne's, Lytham St. Anne's, Lancs.

	Price net s. d.	*Post free* s. d.
House of Commons Bills (Session 1940-41):		
41. Pharmacy and Medicine Bill. Explanatory Memorandum ...	0 3	0 4
War Office:		
Chemical Warfare, Medical Manual of, 1940. Amendments No. 1, June, 1941. (57-9999)	0 1	0 2

IN PARLIAMENT

Lords Debate Agricultural Policy

In the House of Lords on July 1st, Lord Teviot, by motion, drew attention to agricultural policy, "especially in regard to the best treatment of the land in order to produce the maximum quantity of healthy food. He had nothing to say to the Government's policy if they anticipated a short war; but if not, he was apprehensive because of the difficulty of fertilising the land with animal fertilisers. The 2,000,000 acres ordered to be ploughed up by Sir Reginald Dorman-Smith, when Minister of Agriculture, would be producing their second crop this year, he pointed out, and there was, in addition, the land ploughed up since and the arable land. What of the future with regard to fertilisation of the land, now that the animal population has been reduced? Artificial manures were no good substitute for animal manure and dangerous in overdoses. "It appears that there will be less food produced in 1942-43 if the present agricultural policy is pursued," he added.

He spoke of the orders and restrictions issued to farmers since 1939, culminating in the "knock-out" blow ordering them to sell 100 per cent. of their wheat to the Government for human consumption. "If you feed a certain amount of what you grow through animals back into the land you get far bigger crops and far more food," he said. He likened the battle for the fertility of the soil to the Battle of the Atlantic, and suggested that the amount of food to be available for the Ministry of Food to distribute should in future be decided by the Ministry of Agriculture.

Milk "The Keystone of the Nutrition Arch"

Viscount Dawson of Penn, who followed, first expressed concern at the decline in production of milk, which, he said, existed side by side with increasing consumption. While the Germans had "talked very big about guns and butter" the available evidence showed that there had been an increase of milk production during 1939-40 in Germany, and that there were to be further increases this year.

"The problem," he said, "is concerned with winter feeding. After vegetables, potatoes and leguminous foods needed for direct human consumption, the next claim should be that of the dairy herds. If milk production is to be maintained," he went on, "dairy cattle must have priority of home-grown food beyond such food as is required for direct human consumption, and the balance of nourishment needed above and beyond what home-grown production can give must be obtained by giving dairy cattle priority in the consumption of imported foods."

He described milk as the "complete and unique food," containing proteins, sugar, fat, vitamins and the essential minerals, calcium, phosphorus and iron—all in particularly valuable form. Meat, cheese and other important foods could, he said, be cut short; but milk was the keystone of the nutrition arch. "Interfere with that," he added, "and the whole fabric will collapse."

He criticised as "an unhappy expedient enforced by decreasing production" the rationing of the adult worker to give more milk to nursing mothers, young children and the sick. "For, after all," he said, "it is the adult worker we are depending on, and whose health and stamina are an important war weapon." The same consideration was, he argued, doubly true of the large body of sedentary workers.

Lord Addison maintained that, so far from there being any danger to the fertility of the soil, we had in neglected grassland a reserve of fertility of "almost unaccountable dimensions."

Maintaining Fertility

Earl De La Warr, who is a practical farmer, pointed out that most farmers felt that whereas they were

primarily concerned with growing more food in the immediate future, it was nevertheless going to be difficult to do unless they took into account the fact that nothing responded so unsatisfactorily to short term policies as the soil. Maintenance of the fertility of the land, especially if there was to be a long war, he described as "absolutely fundamental."

His advice was that farmers should in future conserve and increase the available supplies of farmyard manure, avoiding certain wasteful methods at present in use. He urged them also to develop as far as they could arable sheep-farming. "By this policy," he said, "we shall increase food for human consumption and increase rather than diminish the fertility of the land."

Lord Wolmer attached prime importance to giving the farmers a sense of security as a method of achieving maximum production. "Is it not possible," he asked, "for those of us who care about agriculture, but are of different political schools, to get together and get a policy which will command the adherence of the country as a whole, so that there should be no more dispute about agricultural policy than about gas or electricity policy?"

The Duke of Norfolk (Joint Parliamentary Secretary to the Ministry of Agriculture) stated the main aim of the Government's policy to be "to increase the total output of the land during the next two or three years. He declared that nothing would be allowed to divert them from that policy, and warned the House against the danger of considering production of any particular crop or livestock apart from the whole.

He assured Lord Dawson that there was no intention of killing any cow that was not either diseased or afflicted in some other way. The total was not expected to exceed five per cent.

The Duke described as instruments to give effect to the policy, propaganda, price control, and a guaranteed market. There was also specific advice and direction given by the county war agricultural committees for maintaining control of feeding-stuffs and fertilisers.

Policy was, he said, made in Whitehall and applied by the county committees. "Local knowledge and experience are the fundamental basis of sound agriculture," he observed.

Though failures and errors of judgment must occur, the face of the countryside had been changed in a comparatively short time. "Anyone who has travelled in many counties, as I have recently," he said, "will realise what an enormous change there is in the countryside."

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Commons and Sport in War-time

On the motion for the adjournment of the House of Commons, on July 2nd, Mr. Shinwell raised the question of the use of petrol for sporting events. He said that we had no right to allow seamen to sacrifice their lives to enable a lot of lazy scroungers to enjoy themselves. If people were misusing petrol something more was required than leaving it to their consciences. National moral was being endangered.

Mr. H. Morrison, Home Secretary, said that racing programmes and meetings had been very largely reduced since the war. For 1941 the racing days approved were 93, compared with 331 in 1938; there were 67 meetings compared with 159; and the meetings had taken place at 15 places compared with 47. This meant that there had been a material reduction of something like 40 per cent. on the average on the figures for the last pre-war year.

He acknowledged the co-operation and good will shown by the Jockey Club and others in bringing this about. He did not dispute the contention that all classes of the community should take the war seriously. But the Government did not take the view that they ought to take the line of excluding reasonable facilities for recreation and entertainment simply for the sake of doing it. If they appeared to be taking the view that they were making it difficult for the public to enjoy themselves in recreations which some might think were a little over the line of moral rectitude, he was not sure that they would get more out of the people. The Government were inclined to think that the people would not like it and would get restive, with the result that they might not be in such good spirit for their work. (Cheers.)

Export of Bloodstock

The Government had materially reduced racing facilities, but they did not take the view that on moral or other grounds racing should be terminated altogether. Racing was a sport which gave a great deal of enjoyment to many sections of the community. There were class-conscious proletarians who knew as much about bloodstock as any aristocrat.

Our export trade in bloodstock amounted to about £600,000 a year. He did not say that was an economic fact of decisive magnitude, but he claimed that it was one of some importance. British bloodstock was the finest in the world and it would be a pity to lose our reputation in that respect. If racing was eliminated the bloodstock industry could not carry on. Therefore, on balance, the Government had come to the conclusion that they ought not to stop horse-racing. They would consider the possibility of further restrictions so long as they did not imperil the continuance of the bloodstock industry. They would also explore the concentration of racing meetings as far as possible on Saturday afternoons. They would be careful to see that race meetings did not interfere materially with railway traffic. The question of the use of petrol was also being watched, and if there was anything he (Mr. Morrison) could do to discourage motor-car traffic for these purposes he would do it. (Cheers.)

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The following are among the questions and answers recently recorded in the Commons:—

Livestock

Mr. Wilfrid Roberts asked the Minister of Agriculture what reduction in beef-cattle he proposes to carry out?

Major Dugdale (Lord Commissioner of the Treasury): I have been asked to reply. In view of the shortage of imported feeding-stuffs, and in the interests of efficient production, farmers have been asked to send for slaughter beef-cattle that are unthrifty and of such inferior conformation that they are unlikely to fatten economically. In giving effect to this culling policy, the Government are not aiming at any specific reduction in numbers, but only at the removal of unprofitable beasts. As regards sound cattle, farmers have again been urged to make themselves self-supporting next winter, both by conserving roughages to the fullest possible extent and by a steady process of adjusting their livestock commitments to their known resources. It is not possible to say what effect this process will have on total numbers.

Mr. Roberts: Has the Minister of Agriculture really no figure in mind as to what reduction would be desirable? Does he leave it entirely to the local committees or to the farmers themselves?

Major Dugdale: It is left entirely to the farmers and to the local committees.

Mr. Thorne: What information are you going to give to the general public about the proper distribution of the beef?

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Milk (Fat Deficiency)

Mr. Douglas asked the Minister of Health whether he is aware of an increase in the number of samples of milk found to be deficient in fat; and whether, in view of the shortage of fats and the consequent necessity of keeping available supplies up to standard, he will urge upon the authorities concerned the necessity of vigilance to prevent the abstraction of butter fat from milk?

Mr. E. Brown: According to my information, food and drugs authorities are fully aware of the importance of this matter, and are active in taking steps to enforce the law with regard to it. I am, however, keeping the matter under review, and if I were convinced of the need for such action as my hon. Friend suggests, I should certainly take it.

Foxes (Destruction of Poultry)

Sir Percy Hurd asked the Minister of Agriculture what steps he is taking to prevent the wholesale destruction of poultry by foxes, as in the instance brought to his notice by the hon. Member for Devizes, when 135 pullets and 35 turkeys were destroyed; and whether he will, through his liaison officers in the various regions of the country, urge county war agricultural committees to give serious attention to this matter?

Major Dugdale: My right hon. Friend is satisfied that, generally speaking, county war agricultural executive committees are taking appropriate steps in this matter. He is making inquiries into the particular instance quoted, and informs me that in any case where it appears that the action taken by a committee is inadequate, he will bring the matter to the notice of the committee concerned.

Sir P. Hurd: Have the county committees really any power in this matter? Owing to war conditions, the local hunts are much restricted in their activities, and this is really a serious menace, which the county committees ought to have greater power to deal with.

Major Dugdale: I understand that the local committees have ample power to deal with the matter.

Commander Locker-Lampson: Will the Government revive fox-hunting?

NOTES AND NEWS

The Editor will be glad to receive items of professional interest for inclusion in these columns.

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Diary of Events

July 17th.—Meeting of the Derbyshire Division, N.V.M.A., at Sutton Bonnington, 2 p.m.

July 17th.—Meeting of the Yorkshire Division, N.V.M.A., at Knaresborough, 2.30 p.m.

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PERSONAL

Illness of Colonel R. J. Stordy.—We regret to inform our readers, so many of whom are directly affected through their activities in connection with the work of the National A.R.P. for Animals Committee, that Colonel R. J. Stordy, Chief Executive Officer of N.A.R.P.A.C., has been seriously indisposed of late. He has been ordered a thorough rest and it is unlikely that he will be able to return to duty for some time.

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Marriage.—Wooldridge—Tonge.—The marriage took place on Saturday, June 14th, at St. Paul's Church, Grove Park, W.4, between Richard Lestocq Wooldridge, M.R.C.V.S. (R.A.F.V.R.), younger son of Mr. and Mrs. H. J. Wooldridge, of 369, High Road, Chiswick, London, and Constance Mary Tonge, W.A.A.F., daughter of Mr. H. T. Tonge, of 82, Hilden Street, Bolton, Lancs.

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R.C.V.S. OBITUARY

Denington, Walter, Brt.-Major, late R.A.V.C. Graduated London, March 27th, 1896. Died at his residence, St. Stephen's Hill, St. Albans, Herts, June 15th, 1941, aged 69 years.

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PHARMACY AND MEDICINES BILL

The Pharmacy and Medicines Bill, which has been introduced in the House of Commons by the Minister of Health, will repeal, from September 2nd, 1941, the medicine stamp duty and the accompanying licence duty payable by those who make or sell patent medicines. It will also regulate the sale of medicines and considerably extend the prohibition of advertisements of remedies for certain diseases.

The proposal to repeal the medicine stamp duties was announced by the Chancellor of the Exchequer in his Budget speech. These duties are based on Acts dating from 1802, and the law presented so many anomalies, that the Government decided that its administration had been unworkable.

The Bill also embodies an agreement, reached in consequence of the repeal of the duties, between the trade interests concerned in the sale of medicines. Under the present law doctors and chemists are permitted to sell "known, admitted, and approved" remedies free of stamp duty, and it has been agreed that doctors and chemists shall have a trading privilege covering that class of remedies. The Bill accordingly provides that while proprietary preparations not described in the British Pharmacopoeia or the British Pharmaceutical Codex—together with certain other types of medicine such as mineral waters and herbal remedies—shall continue to be sold by unqualified retailers, all other medicines shall be sold only by doctors and chemists.

To put an end to "secret remedies" the Bill proposes than from January 1st, 1942, all medicines except those made up and supplied to a particular person on a prescription shall bear on the wrapper or on a label a statement of their composition or of the active constituents.

At present the only patent medicine advertisements prohibited by law are those relating to reputed remedies for venereal diseases and cancer. This Bill proposes to extend this prohibition to advertisements of supposed remedies for Bright's disease, cataract, diabetes, epilepsy or fits, locomotor ataxy, paralysis, or tuberculosis. All these are serious diseases where delay in seeking proper treatment is dangerous.

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UNIVERSITY OF LIVERPOOL, SCHOOL OF VETERINARY SCIENCE

B.V.Sc. Degree Examination Results

Following is the University of Liverpool, School of Veterinary Science, examination list for June, 1941, in connection with the University Degree of B.V.Sc.:—

Fourth Examination.—Bolton, J. F., Boundy, T., Carlyle, A., Dugdill, R. S., Jones, E. B., Jones, J., Jones, W. M., Jubb, Sylvia C., Kerr, P. A., McCreanor, Mary, •MacLennan, I. S., Richards, R. A., •Unsworth, K.

• Distinction in Veterinary Parasitology and Entomology.

Third Examination.—*Part I*: Chapman, F. A., Cohen, C. A., Davision, F. L., Edwards, A. M., Ford, E. J. H. with Distinction; Griffiths, R. B., Harries, J. O., Hutchinson, J., Jennings, A. R., Loosmore, R. M., McLaren, I. S., Mutch, A., Parkinson, J. D., Saunders, C. N. with Distinction; Singleton, A. G., Thomas, E. V., Towers, K. G. with Distinction; Walker, J., Wood, J. C.; *Part II*: Chapman, F. A., Cohen, C. A., Duckett, A. L., Edwards, A. M., Ford, E. J. H., Harries, J. O., Hutchinson, J., Jennings, A. R. with Distinction; Loosmore, R. M., Mutch, A., Parkinson, J. D. with Distinction; Rimmer, B., Saunders, C. N. with Distinction; Singleton, A. G., Thomas, E. V., Towers, K. G. with Distinction; Wood, J. C.; *Part III*: Chapman, F. A., Cohen, C. A., Duckett, A. L., Edwards, A. M., Ford, E. J. H., Harries, J. O., Hunnam, R., Hutchinson, J., •Jennings, A. R., •Loosmore, R. M., Mutch, A., Parkinson, J. D., Saunders, C. N., Singleton, A. G., Thomas, E. V., Towers, K. G., Walker, J., Wood, J. C.

• Distinction in Animal Husbandry.

First Examination.—*Part I*: Alun-Jones, W. S., Arthur, T. H., Ash, Dorcas, M., Eggington, Dorthy N., Evans, J. R., Forrest, E., Jones, K. W. R., Mills, Susan; Obertelli, J. M. with Distinction; Penny, R. H. C., Reed, G. P., Robinson, F. E., Whitfield, G. D., Williams, C. P., Williams, J.; *Part II*: Arthur, T. H., Ash, Dorcas M., Forrest, E., Highet, D. R., Jones, K. W. R., Obertelli, J. M., Penny, R. H. C., Reed, G. P., Robinson, F. E., Whitfield, G. D., Williams, C. P.; *Part III*: Alun-Jones, W. S., Arthur, T. H., Ash, Dorcas M., Beaumont, W., Eggington, Dorothy N., Evans, J. R., Forrest, E., Highet, D. R., Hull, P. N., Kidd, J., Mills, Susan; Obertelli, J. M., Penny, R. H. C., Reed, G. P., Robinson, F. E., Tunstall, E. T., Whitfield, G. D.

SUMMER RATIONS FOR DAIRY STOCK

In a joint announcement the agricultural departments and Ministry of Food say that it has been decided to extend the principle of giving allowances of concentrates to high-yielding dairy herds. Dairy farmers will be able to obtain during July additional rations of 14 lb. or 28 lb. per cow where the average daily yield of the herd (including dry cows) during May was in excess of 3¼ or 4 gallons respectively.

Supplementary Rations for Dairy Cows

The announcement continues: although grazing is generally adequate during the summer to provide for maintenance and milk production, it deteriorates as the summer advances, and this deterioration is not uniform over the whole country. In order to enable County War Agricultural Executive Committees to provide extra rations in cases of proved need, a small reserve is being placed at their disposal. Dairy farmers whose pasture deteriorates at the end of June and who must have additional concentrates to maintain milk yields should apply to their County War Committees. Application may also be made where there is a proportion of very high-yielding cows in the herd or where there was an exceptionally large number of dry cows in the herd in the month upon which milk yield supplements are calculated.

The size of the reserve in each county will depend upon the number of cows in the county, and the normal quality of summer grazings. A larger reserve is being allowed to those counties which did not benefit by the ½-cwt. per cow additional basic issue made in May. The reserve at the disposal of each County Committee is, however limited, and farmers should only apply for an issue from it if they are in real need.

Indoor Feeding of Calves

In certain districts it is usual to feed calves indoors during the months of July to September, owing to the prevalence of "husk" or "hoose" and the consequent risk to calves on pasture. Farmers who normally adopt this practice may be allowed coupons at the rate of 42 lb. per calf per month during that period. They should make application each month to their County War Agricultural Executive Committee, stating the number of calves of 6 to 12 months which are being fed indoors on account of the prevalence of "husk" or "hoose." Allowances of 42 lb. of calf food per month are already given for calves under 6 months old. These allowances will be continued during July, August and September.

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SAVING THE PIG POPULATION

At a recent meeting called by the Federation of Wholesale Fresh Meat Traders, reports *The Meat Trades Journal*, assertions were made that the pig population has fallen to an alarming extent since the outbreak of war, and fears were expressed that if some action was not taken to preserve the number of sows the decline in numbers could never be made up.

Mr. Wilson (Leeds) emphasised that they had no criticism of the Government's policy when it was put into operation; the battle of the Atlantic might well have gone in a different direction. In the light of the waste food which was now being used for feeding the pigs, it was contended that there was now room for a greater number of pigs to be reared. Apart from the meat-producing qualities of the pig, it provided far more fat than any other animal, a factor which should be taken into consideration more in time of war than otherwise.

In support of the contention that there was now justification for an increase in the production of pigs, Mr. Entwistle (Manchester) said a town with a population of 10,000 yielded eight tons of concentrated swill per month, which was sufficient to feed 350 pigs.

Mr. E. A. Bird (Nottingham) stated that from facts which had been supplied it was evident that this nation could produce sufficient pigs and pig products without the importation of any further cereals; in fact, he would go so far as to say there need not be any imported at all in the light of the present collection of kitchen waste and the suggested increased growing of potatoes on waste land. It should be possible by this means to produce 8,000,000 pigs a year. He suggested that the matter should be energetically taken up with the Ministry of Food for a revision of their policy.

The meeting appointed a deputation to wait upon the Ministry to consider the question of the compulsory collection and utilisation of kitchen waste and other waste foods; the production and utilisation of potatoes and other feeding-stuffs; the advisability of concentrating on flesh production and the tightening up of cottagers' conditions.

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FOOT-AND-MOUTH DISEASE

On Monday last foot-and-mouth disease was confirmed among cattle at Coalburn, Lanarkshire.

The foot-and-mouth disease situation in Ireland would seem now to be well in hand. Dublin Port is opened this week for restricted export of fat cattle and shipment for immediate slaughter. The six-months-old ban on the holding of Dublin cattle market will be lifted, and the ban on the movement of livestock in most of the Midland, North-Eastern, North-Western, and Western counties will be withdrawn.

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PRESCRIPTION OF SCARCE DRUGS

"Reports which reach us from various sources seem to indicate that the recommendations to prescribers contained in the M.R.C. memorandum on economy in the use of drugs in war-time have not been followed to any general extent," states *The Pharmaceutical Journal* of June 7th, and continues: "It would also appear that the permission given to pharmacists by virtue of an official Order, to substitute certain sodium compounds for potassium compounds under conditions set out in the Order is not being used so freely as one might have expected. The matter of the prescription of drugs which in the view of the Medical Research Council should be prescribed with strict economy is one which concerns doctors, but as pharmacists are better acquainted than members of the medical profession with the state of the drug market, it might be helpful, and would not be out of place, if they were to choose convenient opportunities to remind prescribers that stocks of certain drugs are very low and cannot be replenished so long as the war lasts. Even in exceptional cases where individual pharmacists happen to be well supplied with a drug which is almost unobtainable in the central market it would be wise to give a hint to doctors who show a fondness for that particular drug that when stocks of it are exhausted it will be imperative to avoid its prescription. In the case of potassium salts the fact that a pharmacist holds adequate stocks to cover the needs of the near future is not a sufficient reason to refrain from dispensing sodium salts to the extent permissible. It is not outside the sphere of possibility that steps may be taken by the authorities at a not distant time to take a census of stocks held by individuals with a view to effecting a more even distribution."

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The Guild of Agricultural Journalists, a new organisation covering Great Britain and Northern Ireland, held an inaugural lunch at the Café Royal, London, recently, with Mr. R. S. Hudson, Minister of Agriculture, as the principal guest. Mr. Hudson congratulated the Guild on its aims, the chief of which is to keep members well informed upon agricultural topics, and expressed the hope that, by its influence, both experts and officials would be able to make fuller use of the Press. The official mind had to be persuaded to discard its fears, and the Press had to make use of the official mind without despondency. If British agriculture had to hold its place in national economy the Press had to educate the public.

FATAL TRICHINIASIS INFECTION

One of the "social aspects" of trichiniasis infection, with special reference to the ingestion of trichina-infested pork, stressed in the annotation on this subject published in our issue of April 12th, was touched upon at a recent inquest at Lewisham when trichiniasis, from eating sausages containing pork, was shown by expert evidence to have caused the death in St. Alfege's Hospital of a woman aged 69.

A daughter said that her mother became unwell three weeks after eating pork sausages. Her eldest brother and witness were also affected. Some blood tests were made in their cases and they had recovered. Her mother was taken to hospital on June 16th and died on June 19th.

Dr. Louis Rosen, assistant medical officer, said he suspected that the woman had trichiniasis on admission. They had had other cases recently in the hospital; some had been discharged; others were still in the process of recovery.

Dr. Arthur Davies, Harley Street, W., pathologist, said he found the trichiniasis worm in the blood of the patient. Death was uncommon in case of such infection. Recovery was the most usual thing.

In reply to the coroner, *Trichina* was a worm that was found in a pig. Adequate cooking would kill it. The pig was infected probably from rats, which are subject to this disease. Pigs eat rats and get the infection in that way.

"It seems to me," said the coroner, "if one has pork one should have it well boiled or perfectly roasted, and that if you have it in the form of sausages you must not have them cooked in batter."

Dr. Davies: No. Any cooking material of that sort would insulate the pork from the full effect of the heat.

Sound pork is of course a good food?—An excellent food. Every care is being taken by the Government authorities that the pork is of good quality before it is sold.

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VIRUSES AND MICE

"It might well be thought that spontaneous diseases of mice, so long as they are not transmissible to man, are of little interest to students of human pathology," says *The British Medical Journal* in a recent issue, which continues: "Actually, a knowledge of spontaneous mouse diseases is of considerable importance, more especially in connection with the investigation of human virus infections. Up to the present it has been impossible to cultivate viruses in the absence of living cells, and as a result in many cases the only test for the presence of a virus depends on the reactions it produces in the tissues of living animals. Especially important are the reactions in mice following intracerebral injection or intranasal instillation. Unfortunately the mouse is itself susceptible to a number of virus infections, often latent or of a low order of virulence, though capable of increased virulence after repeated passage. Some years ago, for instance, Theiler[1] described a spontaneous encephalomyelitis in mice, the pathological lesions being not unlike those found in poliomyelitis in man. More recently there have been isolated from mice viruses which on intranasal instillation into mice are capable of setting up pneumonia. At least two of such lung viruses are now known. The first was isolated in America by Dochez, Mills, and Mulliken[2] and later by Gordon, Freeman, and Clampit.[3] This virus is readily found in certain strains of mice by making rapid serial passages of the lungs at intervals of from four to five days, the inoculated mice dying with pneumonia in two to four days. The virus is pathogenic for ferrets, producing high fever and nasal symptoms in these animals, while unpublished observations show that it is, in addition, highly virulent for hedgehogs. Curiously enough it has a very poor immunising action, and is often incapable of protecting mice against itself. More recently Horsfall and Hahn[4] have isolated a second virus from the lungs of certain strains of apparently healthy mice. This virus is avirulent as it occurs in normal mouse lungs and becomes virulent only when serial mouse passages are made at intervals of seven to nine days, death occurring eight or more days after inoculation. The virus is completely non-pathogenic for other species of animals, and in addition is an excellent antigenic agent readily immunising mice after either intraperitoneal or intranasal inoculation. Of considerable importance is the finding that about 30 per cent. of normal human sera are able to neutralise the virus. In this connection it must be remembered that at least two viruses definitely pathogenic for man have also been isolated from apparently normal mice. The virus of lymphocytic choriomeningitis has been found in the brains of apparently normal tame mice in America (Traub[5]), England (Findlay, Alcock, and Stern[6]), France (Lépine and Sautter[7]), and Japan (Kasahara and others[8]), and in the brains of wild mice in America by Armstrong and Sweet.[9] In Japan, Kawamura[10] and his colleagues have recently found that the virus of Japanese Type B encephalitis, a highly fatal human infection, can also be obtained from the brains of apparently normal mice. Observations also have lately shown that in addition to the true viruses mice harbour a number of strains of pleuropneumonia-like organisms. These organisms, though easily filtrable and with dimensions not much greater than those of vaccinia, differ from viruses in that they can be cultivated in media rich in serum in the absence of living cells. They were first isolated from the brains of mice inoculated intracerebrally with virus containing material by Findlay, Klieneberger, Mackenzie, and MacCallum[11 12] and later in America by Sabin.[13] The majority of strains produce in mice encephalitis, arthritis, and pneumonia, but Sullivan and Dienes[14] in America, and Edward[15] in this country, have isolated from apparently healthy mouse lungs strains the pathogenic activities of which appear to be limited to the lungs. Since mice are now used in ever-increasing numbers in studies of human influenza and many other viruses, it is obvious that the spontaneous infections of the mouse require full and accurate investigation."

(1) *J. exp. Med.* (1937.) **65**. 705.
(2) *Proc. Soc. exp. Biol.*, N.Y. (1937.) **36**. 683.
(3) *Ibid.* (1938.) **38**. 450.
(4) *J. exp. Med.* (1940.) **71**. 391.
(5) *Science.* (1935.) **81**. 298.
(6) *Lancet.* (1936.) **1**. 650.
(7) *C. r. Acad. Sci.*, Paris. (1936.) **202**. 1624.
(8) *Trans. Soc. Path. Japan.* (1937.) **27**. 581.
(9) *Publ. Hlth. Rep.* (1939.) **49**. 1019.
(10) *Kitasato Arch. exper. Med.* (1940.) **17**. 38.
(11) *Lancet.* (1938.) **2**. 1511.
(12) *Trans. roy. Soc. trop. Med. Hyg.* (1939.) **33**. 6.
(13) *Science.* (1938.) **88**. 575; (1939.) **89**. 228.
(14) *Proc. Soc. exp. Biol.* N.Y. (1939.) **41**. 620.
(15) *J. Path. Bact.* (1940.) **50**. 409.

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SULPHONAMIDES APPLIED LOCALLY

In a recent issue of the *Lancet* it is stated:—

"The use of sulphonamides in the prophylactic treatment of potentially infected wounds is already widespread, though there is no common consent as to how they exercise their protective effect. Either there is a local bacteriostatic action, or the sulphonamide is absorbed into the general circulation and acts as it would if given by mouth or injection. Herrell and Brown have observed concentrations as high as 2·5 and 3 mg. per 100 c.cm. in the blood of patients who had received no more than 1·6 g. of sulphonamide in suspension administered locally thrice daily in the treatment of infected thoracic cavities. Such concentrations, however, were observed only when the sulphonamide had been used in body cavities with a large absorptive surface, such as the pleura or peritoneum. In other localities the amount in the blood was too small to be detected by ordinary methods. They consider that the clinical response of infected wounds to local application of these compounds is far greater than might be

expected from the blood concentrations attained. In his account of the treatment of war wounds in France J. S. Jeffrey records a favourable impression of the prophylactic treatment of wounds with sulphonamide packs. The quantity of powder used depended on the size of the wound, and where the track could not be fully laid open a satisfactory mode of treatment lay in the insertion of from 5 to 15 g. of sulphonamide with the assistance of the simple pump introduced by Colonel Colebrook. Unfortunately the catastrophic nature of the campaign made record-keeping and the arrangement of control series impossible, and further work alone will establish the claims of this line of treatment. Jeffrey found no evidence that sulphonamide alone and without operation saved any case of true gas gangrene, but it was helpful in combination with serum therapy. He considers that a sulphonamide can be usefully applied before encasing a compound fracture in plaster; Herrell and Brown share this opinion and have treated a wide variety of infected wounds locally with sulphanilamide; though their results have not been uniform, they consider them sufficiently encouraging to continue the practice. They prefer a thick suspension prepared by adding 2 g. of powdered sulphanilamide to 100 c.cm. of a 0·8 per cent. solution of sulphanilamide in normal saline. They apply this thrice daily and have been pleased by the response of infected wounds involving the pleural cavity. The results appeared to be equally good whether the infection was streptococcal, staphylococcal or pneumococcal. A controlled investigation is urgently needed now to show whether these optimistic impressions can be supported by figures."

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TWO NEW VIRUS DISEASES OF MAN

"The last 20 years of the nineteenth century will be remembered as the golden age of bacteriological discovery; the period between the two world wars deserves equal credit in regard to virus research. Not only many long-known diseases but also many new ones have been traced to virus infection. To the long list of viruses capable of attacking the nervous system must now be added two new-comers, one from Soviet Russia and the other from Uganda. In 1937 cases of human encephalitis were described in the Soviet far east by Chumakov and Gladkikh.* The disease, known as Taiga or spring-summer encephalitis, is endemic in various well-wooded localities and makes its appearance about the end of May or the beginning of June—a period before the appearance of the mosquito plague—but cases continue till September. The people affected are wood-cutters, hunters and others whose occupations take them into the forests. The onset is sudden with fever, vomiting, meningismus, loss of consciousness and often flaccid paresis, paralysis and atrophy affecting especially the muscles of the upper limbs and neck. From the brains of three people who died of the disease, and from the blood of one patient, strains of a virus pathogenic to mice have been isolated. In many ways the new virus resembles those of St. Louis and the Japanese B encephalitis, although it appears to differ in antigenic structure. It is transmitted by the bite of the tick *Ixodes persilcatus* Schulz 1930, thus resembling the virus of louping ill which is carried by *I. ricinus*. Unlike louping ill, however, the Soviet virus is said to be hereditarily transmitted by the tick, which suffers no ill effects. Pavlovski incriminates two other ticks as vectors, *Dermacentor silvarum* Olen. and *Haemaphysalis concinna* Koch, in both of which hereditary transmission occurs. The same virus has also been isolated from the brains of wild rodents such as squirrels and hares living in endemic areas. Chumakov and Seitlenok consider that the disease is not confined to the far east of Siberia because the sera of persons from Western Siberia and from places in European Russia, Belarussia, Perm and Kirov contain antibodies to the virus. Belarussia is a western district adjoining the Polish frontier. This tick-transmitted encephalitis is apparently quite distinct from the Russian form of equine encephalomyelitis, though whether the Russian, like the American, equine encephalomyelitis virus is pathogenic for man is still unknown.

"Another neurotropic virus has recently been found in Uganda by Smithburn and his colleagues of the Rockefeller International Foundation. The virus was originally isolated from the blood of a woman who showed no symptoms except slight fever. When the virus was inoculated into the brains of mice they developed nervous symptoms and died, as did rhesus monkeys inoculated intracerebrally. The degenerative changes present in the Purkinje cells of the cerebellum recall those produced by the louping-ill virus, but there is no cross immunity either with this virus or with those of Japanese B or St. Louis encephalitis. Sera from natives of the West Nile district of the Northern Province of Uganda contain immune bodies against the new virus. Further observations are required to determine its distribution in Africa and elsewhere."—*The Lancet* (Nov. 23rd, 1940).

* Chumakov, M. P., and Gladkikh, S. G. *Bull. Biol. med. exp., U.S.S.R.* 1940. 7. 2.

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SALT TREATMENT FOR BLOODY DIARRHOEA

The following note relative to the above appears in the April, 1941, issue of *Veterinary Medicine*: "What is known as the 'salt treatment for enteritis in feeder pigs' is enjoying some popularity among a considerable number of Iowa practitioners. It is administered as follows: Ten pounds of salt is dissolved in 50 gallons of water (or three to four lbs. in 15 gallons). The affected animals are given all the oats soaked in this solution they will eat twice daily for a period of four days, no other food being allowed. After three days of normal feeding the treatment is repeated for another four-day period. Usually this is sufficient to stop diarrhoea and show marked improvement. It is essential to the success of the treatment that plenty of fresh, clean water be available to the animals at all times, while they are on the salt-impregnated diet. It must be near where the salt-soaked oats are fed. If it be even only a few rods away the swine will not drink it as often and as plentifully as they should, and the results of the treatment will be unsatisfactory and may even be disastrous.

"Another method of giving the salt treatment considered best for hogs that are following cattle is to take the animals away from the cattle, pen them up where there is no food to be had and then give them all the salted buttermilk they will drink for four days; then buttermilk that is not salted for three days. The buttermilk-salt treatment is then repeated. For this treatment salt is added to the buttermilk at the rate of ten lbs. to 50 gallons. Some use this salt-and-buttermilk regimen as a prophylactic, *i.e.*, subject the pigs to it before they are turned into the cattle lot. This is regarded as good practice for all sales barn or stock yard pigs.

"It has been found in a few herds that ten lbs. of salt can be added to 15 gallons of water in which three bushels of oats are soaked, and the mixture fed twice daily for three to four days; the salt is discontinued for three days, and then the salt-soaked oats fed again for another four days. It has been demonstrated by at least one feeder of large numbers of hogs that they will tolerate ten lbs. of salt in 15 gallons of water with three bushels of oats soaked in it for six days, after which they appear to eat less, indicating that a possible salt tolerance has been reached. Salt poisoning has been reported to have occurred in only a very few instances and in each case the hogs did not get an ample supply of water during the salt treatment period. In fact, salt poisoning is probably a myth, although it is known that poisoning may result from certain combinations in which salt is the principal ingredient (for example, the brine in which salt pork has been cured)."

CORRESPONDENCE

Letters to the Editor should reach the Office not later than by the first post on Tuesday morning for insertion in following Saturday's issue.

The views expressed in letters addressed to the Editor represent the personal view of the writer only and must not be taken as expressing the opinion or having received the approval of the N.V.M.A.

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A PRACTITIONER'S COMPLAINT

To the Editor of the Veterinary Record

Sir,—Much as I hate to criticise "the hand that rocks the cradle" I should like to hear other people's opinion, with a view to formulating a protest through the N.V.M.A., as to the treatment of the general practitioner by the Ministry of Agriculture under present war conditions.

I can only state my own case, but I have no doubt that others have a much bigger grouse than I have.

My practice, established about a century, is in an East Coast town, which has been pretty badly "blitzed" by the Hun and has been drastically evacuated, to the extent of almost completely ruining my horse and small-animal practice in the town. Practically all of my country practice is in the restricted area and all livestock is considerably cut down. Disastrous as this is, "C'est la guerre" and also "guerre No. 2 or 3" for many of us.

I hold a Panel "A" appointment under the Ministry of Agriculture and had hoped that the Ministry, at least, would have had some compassion, instead of which my work for them becomes less and less. When the Ministry took to itself the title of Animal Health Department and took over the duties of the local authorities a great many of us were very worried for fear that this was only the beginning of the freezing out of the part-time inspector and that the introduction of further legislation would leave us only the disagreeable and least remunerative part of the practice to earn our daily bread. However, we were assured that this would not be the case—on the contrary, that it would be a godsend to us to serve a reasonably generous Government department, rather than the proverbially "long-winded" farmer. Now, through military reasons, our incomes are severely cut and it seems unfair that this so-called "godsend" has also been considerably cut down by whole-time inspectors carrying out routine inspections of dairy herds, and a large proportion of swine fever cases.

It is quite obvious that, for economy, the full-time staff must be kept fully employed, but, surely not by taking from us the bread and butter which we have virtually earned by achievement through a great number of years. Over and above all this our fees and allowances for mileage remain as pre-war, in spite of hugely increased expenses by war insurances, running costs, etc.

It should be remembered that we are playing our part in the struggle without a word of complaint and are quite prepared to take whatever is coming to us from the enemy, but, for own own Government, whom most of us have served very faithfully for many years, to aggravate our misfortunes, is rather unjust and I feel sure cannot be intentional.

Faithfully yours,

W. Shipley, M.R.C.V.S.

Southtown,

Great Yarmouth.

July 4th, 1941.

A warning against poison gas sprayed from aeroplanes has been issued to owners of food stocks, including farmers. Farmers, it stated, should see that grain and feeding stuffs are adequately protected at all times. This can be done where open to the atmosphere by covering the food with tarpaulins of the oil-dressed type.

DISEASES OF ANIMALS ACTS, 1894 to 1937, and AGRICULTURE ACT, 1937 (PART IV).

Summary of Returns of Confirmed Outbreaks of Scheduled (Notifiable) Diseases

Period.	Anthrax.		Foot-and-Mouth Disease.		Parasitic§ Mange.		Sheep Scab.	Swine Fever.	
	Outbreaks confirmed.	Animals attacked.	Outbreaks confirmed.	Animals slaughtered as diseased or exposed to infection.	Outbreaks confirmed.	Animals attacked.	Outbreaks confirmed.	Outbreaks confirmed.	Swine slaughtered.
	No.	No.	No.	No.	No.	No.	No.	No.	No.
Period 1st to 15th June, 1941	21	29*	2	341	—	—	2	37	17
Corresponding period in ...									
1940	10	14	1	301	—	—	—	228	205
1939	22	24	9	899	2	6	—	131	109
1938	31	34	1	18	2	4	4	41	37
Total 1st January to 15th June 1941	265	294	255	26,439	8	25	131	761	360
Corresponding period in									
1940	270	296	19	2,853	14	27	115	1,895	1,256
1939	423	456	38	5,256	30	66	147	896	588
1938	460	502	153	19,901	42	69	102	261	182

Note.—The figures for the current year are approximate only. §Excluding outbreaks in Army Horses.

* One of these animals refers to an outbreak confirmed prior to June 1st, 1941.